

Application No.: 10/520,686
Response to Office Action of August 4, 2005
Attorney Docket: NOTAR-018US

Amendments to the Drawings:

By this amendment, Figure 2 has been amended by replacing the upper “X” with “7”; replacing the upper “X’ “ with “X”; and replacing reference numeral “7” with “X”. Also, Applicant has identified the part associated with reference numeral 22 in Figure 4.

REMARKS

This is a response to the Office Action dated August 4, 2005.

SUMMARY OF OFFICE ACTION

In the Office Action, the drawing was objected to in that the reference numeral 22 as set forth in Claim 4 and the control and adjustment means set forth in Claim 7 are not shown in the drawings.

The specification was objected to for various formalities, typographical errors and inconsistencies with the drawings.

Claims 1-8 were rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to particular point out and distinctly claim the subject matter which Applicant regards as the invention.

Claims 1 and 7 were rejected under 35 U.S.C. §103(a) as being unpatentable over Fukase et al. and further in view of Sawada et al. or LaTour. Claims 2 and 8 were rejected under 35 U.S.C. §103(a) as being unpatentable over Fukase et al. and further in view of Sawada et al. or LaTour as applied to Claim 1 above and further in view of Steger.

The Examiner indicated that Claims 3-6 contain allowable subject matter and will be allowed when the objections to the drawings and the specification and the rejection to the claims discussed above are overcome.

APPLICANT'S RESPONSE

DRAWINGS

Submitted concurrently herewith is replacement drawings for Figures 2 and 4. (see Exhibit 1). Figure 2 has been amended by replacing the upper "X" with "7"; replacing the upper "X" with "X"; and replacing reference numeral "7" with "X". Also, Applicant has identified the part associated with reference numeral 22 in Figure 4.

Moreover, the control and adjustment means limitation recited in Claim 7 has been deleted.

For the foregoing reasons, the Examiner's objections to the drawings are overcome.

SPECIFICATION

Page 3, line 18 and page 4, line 19 respectively refer to Claims 1 and 7. As will be discussed in detail below, Claims 1 and 7 have been amended. Correspondingly, Applicants have amended the specification at the above-mentioned locations such that the description is commensurate with the scope of amended Claims 1 and 7.

The division sign “÷” located throughout the specification as indicated in the Office Action has been replaced with a dash symbol “-”.

CLAIM REJECTIONS UNDER 35 U.S.C. §112, SECOND PARAGRAPH

Claim 1, Line 3 recites “an ingot mould”. Such reference has been changed to “a mould.” Moreover, in Claim 3 the term “recovering displacements” has been replaced with the phrase “allowing for mutual approaching and distancing of said rolls (11, 11’).” Accordingly, the Examiner’s rejection of Claims 1-8 under 35 U.S.C. §112, second paragraph have been overcome.

CLAIM REJECTION UNDER 35 U.S.C. §103(a)

CLAIMS 1-6

Claim 1 has been amended to incorporate the subject matter (i.e., magnetostrictive actuator) of Claim 2. Further, Claim 1 has been amended to further recite a load cell and a preloading system. The magnetostrictive actuator, load cell and the preloading system contribute synergistically with each other to provide a more rapid and reliable distancing of the rolls. The importance of rapid and reliable distancing of the rolls is highlighted in the specification at page 3 which recites that:

“A problem to be solved in the plants of this type is that of ensuring movements of approaching and removal which are as quick as possible also to face emergency conditions, such as when a quick and almost immediate distancing of the rolls is required to drop the molten metal which is still upon the rolls.

Another problem to be solved is that of improving the reliability of the supports to minimize the danger of seizure in operation, which may compromise the roll assembly itself with serious consequences.” (emphasis added).

The magnetostrictive actuator assists in the rapid and reliable distancing of the rolls because the magnetostrictive actuator can be elongated and shortened very rapidly. As stated

in the specification, a bar of the magnetostrictive actuator 10 cm long can be elongated 0.1 mm within 50 μ s. The benefit of being able to rapidly elongate or shorten the bar of the magnetostrictive actuator is that the rolls can be rapidly displaced away from each other for discharging the molten metal during emergency conditions. This is further explained in the specification at page 9, lns. 16-19. Accordingly, the magnetostrictive actuator prevents the casting plant of Claim 1 from becoming damaged due to molten metal caught in the mold because the magnetostrictive actuator is able to quickly/rapidly displace the rolls away from each other and release the molten metal before any damage is done to the rolls.

The magnetostrictive actuator also adjusts the distance between the rolls during operation of the casting plant to adjust for variations. This is further explained in the specification at page 8, lns. 1-29. Accordingly, the magnetostrictive actuator performs both the function of (1) displacing the rolls away from each other to discharge the molten metal during emergency situations and (2) adjusting the distance between the rolls as the metallic strips are being casted. If the mechanism for displacing the rolls away from each other during emergency conditions was separate from the mechanism to adjust the distance between the rolls during operation, then the mechanism to adjust works against the mechanism for displacing. The reason is that the mechanism for displacing spreads the rolls away from each other, while the mechanism for adjusting may bring the rolls closer to each other. Accordingly, separating the two mechanisms increases the time to displace the rolls away from each other during emergency situations because one mechanism spreads the rolls away from each other while the other mechanism brings the rolls closer to each other. Fortunately, the magnetostrictive actuator recited in Claim 1 performs both functions. As such, while the actuator is adjusting the rolls during operation, the actuator can also immediately spread the rolls apart from each other in case of an emergency. Hence, the use of the magnetostrictive actuator provides the advantage of quick and reliable modes of operation when the rolls are displaced away from each other during emergency situations as well as when the rolls are adjusted during operation.

The preload system and the load cell also contribute to increase the overall reliability of the casting plant because they reduce the stress on the bar of the magnetostrictive actuator.

The invention recited in amended Claim 1 is not disclosed by Fukase et al. because Fukase et al. does not disclose a magnetostrictive actuator. The rolls of the Fukase et al. casting plant are displaced with a spring biasing unit and a biasing unit incorporating a pressure fluid actuator and not a magnetostrictive actuator. In support thereof, Applicants respectfully direct the Examiner's attention to col. 5, lns. 37-41 which recites that "the roll biasing units 110 at one side of the machine are fitted with helical biasing springs 112 to provide biasing forces on the respective roll supports 104 whereas the biasing units 111 at the other side of the machine incorporate hydraulic actuators 113." Hence, the cited prior art does not disclose the invention recited in amended Claim 1.

Furthermore, there is no motivation to combine the teachings of Steger (i.e., magnetostrictive actuator) into the Fukase casting plant because such combination would render the Fukase casting plant inoperable for its intended purpose (i.e., casting metallic strips). The magnetostrictive actuator of Steger, as understood, behaves as an on-off switch. The magnetostrictive actuator either applies a clamping force or releases the clamping force. The magnetostrictive actuator does not vary the amount of clamping force during operation of device.

In Fukase, the rolls are incrementally displaced closer together or further apart to accommodate changes during the casting plant's operation. In support thereof, Applicant respectfully directs the Examiner's attention to col. 7, lns. 58-62. If the magnetostrictive actuator of Steger were incorporated into the Fukase casting plant for displacing the rolls then the rolls would not be incrementally displaced further apart or closer together due to changes during the casting plant's operation. Rather, the rolls would either be fully closed or fully apart with respect to each other. There would be no incremental adjustment in the distance between the rolls to account for changes during the operation of the casting plant. Accordingly, the casting plant of Fukase would be inoperable to cast thin metallic strips. Hence, there is no motivation to combine the magnetostrictive actuator of Steger into the Fukase casting plant.

Another reason there is no motivation to combine the Steger teachings into the Fukase casting plant is that Steger teaches separating the functions of (1) rapid opening and closing and (2) applying a clamping force. In support thereof, Applicant respectfully directs

the Examiner's attention to col. 1, lns. 56-59 of Steger which recites that "an object of the invention is to provide a clamping mechanism for an injection molding machine in which the rapid closure movement and the subsequent clamping force generation are decoupled." (emphasis added). Col. 3, lns. 28-31 of Steger recites that "hydraulic cylinders ... are used to traverse the moving platen." As such, the hydraulic cylinders are utilized to open and close the platens (i.e., rolls). Also, col. 4, lns. 11-19 explains that the elements 13 (i.e., magnetostrictive elements) provides the subsequent clamping force. Accordingly, the Steger reference teaches separating or decoupling (1) the means by which the platen (i.e., rolls) are opened and closed and (2) the means by which the platen (i.e., rolls) are held stationary with respect to each other. In contrast, the Fukase casting plant appears to accomplish both tasks with either the hydraulic actuator or the biasing springs, as understood. Hence, there is no motivation to incorporate the magnetostrictive actuator of Steger into the Fukase casting plant.

For the foregoing reasons, Claim 1 is believed to be in condition for allowance.

The dependent claims of Claim 1 are also believed to be in condition for allowance for being dependent upon an allowable base Claim 1 and for containing additional patentable subject matter.

CLAIMS 7-8

In the Office Action, Claim 7 was rejected for the same reasons that Claim 1 was rejected. In response, Applicants have incorporated the subject matter of Claim 2 into Claim 7, namely, the magnetostrictive actuator. For the same reasons discussed above in relation to the magnetostrictive actuator, Applicants respectfully submit that Claim 7 is in condition for allowance.

Claim 8 which is dependent on Claim 7 is also believed to be in condition for allowance for containing additional patentable subject matter. The cited prior art does not disclose, suggest or make obvious elongating or shortening the magnetostrictive bars as a function of the separation force. In this manner, the bar of the magnetostrictive actuator is incrementally elongated or shortened based on the amount of separation force. Hence, Claim 8 is believed to be in condition for allowance. Also, Claim 8 is believed to be in condition for allowance for being dependent upon an allowable base claim 7.

NEW CLAIMS 9-10

Applicant respectfully request entry of new Claim 9 into the prosecution of the above-identified patent application. New Claim 9 recites that the magnetostrictive actuator is operative to permit incremental movement of approaching and distancing between the first and second rolls. The term "incremental" is used broadly to also encompass the concept that the first and second rolls may also be slidingly brought closer to or further apart from each other and held at any intermediate position. The cited prior art does not disclose a magnetostrictive actuator that is operative to permit incremental movement. As discussed above, the magnetostrictive actuator of Steger behaves to either fully close or fully spread apart the rolls with respect to each other. The magnetostrictive actuator of Steger does not incrementally move the rolls together which as discussed in the instant specification is needed to make corrections to the casting operations. (See instant specification, page 6, lns. 10-12). Moreover, as discussed above in relation to Claim 1, there is no motivation to combine the magnetostrictive actuator of Steger into the Fukase device. Hence, Claim 9 is believed to be in condition for allowance.

Claim 10 which is dependent on Claim 9 is also believed to be in condition for allowance for containing additional patentable subject matter. Claim 10 further recites a control system operative to vary the intensity of magnetic fields about a magnetostrictive bar of the actuator to either to elongate or shorten the magnetostrictive bar as a function of the separation force. The cited prior art, namely Steger does not vary the magnetic field about the bar as a function of the separation force. Rather, the magnetic field of Steger is either fully on or fully off, and it is not varied as a function of the separation force. Hence, the cited prior art does not disclose, suggest or make obvious the invention recited in Claim 10, and thus Claim 10 is believed to be in condition for allowance.

CONCLUSION

On the basis of the foregoing, Applicants respectfully submit that Claims 1-10 are in condition for allowance. Applicants therefore respectfully submit that all the stated grounds of rejections and objections made in the Office Action have been overcome. Accordingly, an early notice of allowance is respectfully requested. Should the Examiner have any

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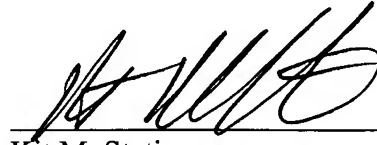
suggestions for expediting allowance of the application, the Examiner is invited to contact Applicants' representative at the number listed below.

If any additional fee is required, please charge Deposit Account Number 19-4330.

Respectfully submitted,

Date: 12/2/05

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